

What is claimed is:

1. A frame structure of a vehicle comprising a flywheel housing, an intermediate housing and a transmission case that are connected to each other along a longitudinal axis of the vehicle to constitute a vehicle frame with an inner space for accommodating a running-power transmission path for transmitting power from an engine to drive wheels via a HST unit: wherein

said flywheel housing has a first end connected to the engine and a second open end opposite to said first end along the longitudinal axis of the vehicle; and

said intermediate housing has a hollow shape with a first end and a second end located along the longitudinal axis of the vehicle, said first end having an abutting surface against which said second end of the flywheel housing abuts, a support surface located radially inwardly of said abutting surface so as to support said HST unit, and an opening surrounded by said support surface, said opening serving as a first-end opening of said intermediate housing along the longitudinal axis of the vehicle;

wherein said abutting surface and said support surface along the longitudinal axis of the vehicle are located so that at least a portion of the HST unit is accommodated within the flywheel housing.

2. A frame structure of a vehicle comprising a flywheel housing, an intermediate housing and a transmission case that are connected to each other along a longitudinal axis of the vehicle to constitute a vehicle frame with an inner space for accommodating a running-power transmission path for transmitting power from an engine to drive wheels via a HST unit: wherein

said flywheel housing has a first abutting surface and a second abutting

surface respectively located closer to a first end and a second end of said flywheel housing along the longitudinal axis of the vehicle, said first abutting surface being connected to the engine, said second abutting surface being connected to said intermediate housing and having a first opening through which said HST unit can pass, said flywheel housing has a hollow shape with a center axis substantially coaxial with a crank shaft of said engine;

said intermediate housing has a hollow body portion and a flange portion, said hollow body portion having a first end and a second end and extending along the longitudinal axis of the vehicle with a center axis displaced downward from said crank shaft, and said flange portion being located closer to said first end of said hollow body portion, said flange portion having an opening in a radial center thereof, said opening of the flange portion serving as a first-end opening of said intermediate housing along the longitudinal axis of the vehicle;

said flange portion has an abutting surface located opposite to said second abutting surface of said flywheel housing and a support surface located radially inward of said abutting surface so as to support said HST unit, and said first-end opening located radially inward of said support surface.

3. A frame structure of a vehicle according to claim 2, wherein said abutting surface and said support surface along the longitudinal axis of the vehicle are located so that at least a portion of the HST unit is accommodated within said flywheel housing.

4. A frame structure of a vehicle according to claim 1, wherein:  
said HST unit includes a pump shaft operatively connected to said engine, a

hydraulic pump unit driven by said pump shaft, a hydraulic motor unit for non-stepwisely changing the speed of drive power from said engine in cooperation with said hydraulic pump, an output shaft rotated by said hydraulic motor unit, and a center section supporting said hydraulic pump unit and said hydraulic motor unit and forming a hydraulic circuit for fluid communication therebetween,

said center section being connected with the support surface of the flange portion so as to seal an inner space of the flywheel housing against the inner space of the intermediate housing in a liquid tight manner.

5. A frame structure of a vehicle according to claim 4, wherein:

at least one of said hydraulic pump unit and said hydraulic motor unit is of a variable displacement type whose suction/discharge rates are variable by a slanting position of a hydraulic operation type output adjusting member,

said hydraulic operation type output adjusting member being controlled by a switching valve in a valve unit provided outside of said flywheel, said intermediate housing and said transmission case.

6. A frame structure of a vehicle according to claim 4, wherein said center section has a first side along the longitudinal axis of the vehicle forming a pump support surface which supports said hydraulic pump unit, and has a second side along the longitudinal axis of the vehicle forming a peripheral edge surface which abuts against said support surface of said flange portion and forming a motor support surface which is located radially inward of said peripheral edge surface and supports said hydraulic motor unit.

7. A frame structure of a vehicle according to claim 6, wherein:

said pump shaft has a first end along the longitudinal axis of the vehicle which extends into said flywheel housing so as to be operatively connected to said driving source, and a second end along the longitudinal axis of the vehicle which passes through said center section toward the second side of the longitudinal axis of the vehicle,

said motor shaft has a second end along the longitudinal axis of the vehicle which extends into said intermediate housing toward the second side of the longitudinal axis of the vehicle,

a main shaft operatively connected to the second-end of said pump shaft and a propeller shaft operatively connected to the second end of said motor shaft are inserted through said intermediate housing along the longitudinal axis of the vehicle.

8. A frame structure of a vehicle according to claim 7, further comprising a center plate interposed between said intermediate housing and said transmission case so as to bearing-support said main shaft and said transmission shaft.

9. A frame structure of a vehicle extending from a first side to a second side of the vehicle along a longitudinal axis of the vehicle so as to constitute a vehicle frame as providing an inner space for accommodating a running-power transmission path for transmitting power from an engine to drive wheels via a HST unit, at least a portion of said inner space defining a hydraulic fluid reservoir space; wherein

said hydraulic fluid reservoir space having a partition wall that divides said hydraulic fluid reservoir space into a filter housing portion for accommodating a filter and a main portion other than said filter housing portion,

said partition wall having a communication port for communication between said filter housing portion and said main portion in a lower region of said hydraulic fluid reservoir space, and  
said filter housing portion being arranged so that at least hydraulic fluid for replenishing said HST unit is taken out from said filter portion.

10. A frame structure of a vehicle according to claim 9, wherein said partition wall is located so as to have the communication hole located substantially at the center of the hydraulic fluid reservoir space with respect to a vehicle width direction.

11. A frame structure of a vehicle according to claim 9, wherein said partition wall is located so as to have the communication hole located substantially at the center of the hydraulic fluid reservoir space with respect to the longitudinal axis of the vehicle.

12. A frame structure of a vehicle according to claim 9, said frame structure being arranged so that an oil heater can be installed in proximity of said communication hole.

13. A frame structure of a vehicle according to claim 9, comprising a flywheel housing, an intermediate housing and a transmission case that are connected to each other along the longitudinal axis of the vehicle: wherein

said flywheel housing has a hollow shape with a first end and a second end located along the longitudinal axis of the vehicle, said first end having a first-end opening and a first-end abutting surface surrounding said first-end opening serving, said second end having a second-end opening and a

second-end abutting surface surrounding said second-end opening;  
said intermediate housing has a hollow shape with a first end and a second end located along the longitudinal axis of the vehicle, said first end having an abutting surface opposed to said second-end surface of the flywheel housing, a support surface located radially inwardly of said abutting surface so as to support said HST unit, and an opening surrounded by said support surface, said opening serving as a first-end opening of said intermediate housing along the longitudinal axis of the vehicle, said second end having an opening serving as a second-end opening of said intermediate housing; and said support surface of said intermediate housing and said HST unit supported by said support surface being arranged so as to divide said inner spaces of said flywheel housing, said intermediate housing and said transmission case into a space of a dry chamber for accommodating a flywheel and said hydraulic fluid reservoir space.

14. A frame structure of a vehicle according to claim 13, wherein said transmission case has a bulge that extends in the vehicle width direction as extending from an opening of the first end of the transmission case towards the second end of the transmission case along the longitudinal axis of the vehicle, said bulge providing a space for said filter housing portion so that a filter can be installed in place by introducing the same from the first side of the longitudinal axis of the vehicle.

15. A frame structure of a vehicle according to claim 13, wherein:  
said transmission case has said filter housing portion on a first side of the lateral axis of the vehicle at a location from the first end opening of the longitudinal axis of the vehicle to the second end of the longitudinal axis of the

vehicle,

said intermediate housing has a recess on the first side of the lateral axis of the vehicle at the second end of said intermediate housing along the longitudinal axis of the vehicle, said a recess is dented toward the second side of the lateral axis of the vehicle so that a filter can be installed in said filter housing portion from the first side of said transmission case along the longitudinal axis of the vehicle.